



Constellation Energy

February 23, 2007

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket No. 50-318; License No. DPR 69
Licensee Event Report 2006-001, Revision 1
Reactor Trip During Performance of Maintenance Clearance Order

The attached supplemental report is being sent to you as required by 10 CFR 50.73. Should you have questions regarding this report, please contact Mr. Jay S. Gaines at (410) 495-5219.

Very truly yours,

Joseph E. Pollock
Plant General Manager

JEP/ALS/bjd

Attachment: As stated

cc: D. V. Pickett, NRC
S. J. Collins, NRC

Resident Inspector, NRC
R. I. McLean, DNR

TE22

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Calvert Cliffs Nuclear Power Plant, Unit 2

2. DOCKET NUMBER

05000 318

3. PAGE

1 OF 005

4. TITLE

Reactor Trip During Performance of Maintenance Clearance Order

5. EVENT DATE

MONTH	DAY	YEAR
11	16	2006

6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO.
2006	- 001 -	01

7. REPORT DATE

MONTH	DAY	YEAR
02	23	2007

8. OTHER FACILITIES INVOLVED

FACILITY NAME	DOCKET NUMBER
	05000
FACILITY NAME	DOCKET NUMBER
	05000

9. OPERATING MODE

1

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER |
| <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.73(a)(2)(i)(B) | <input type="checkbox"/> 50.73(a)(2)(v)(D) | |

Specify in Abstract below
or in NRC Form 366A

10. POWER LEVEL

100

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

A. L. Simpson, Principal Engineer

TELEPHONE NUMBER (Include Area Code)

410-495-6913

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX
B	AB	20	0243	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO15. EXPECTED
SUBMISSION
DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On November 16, 2006, the Unit 2 Reactor automatically tripped due to a pressurizer pressure high signal from the Reactor Protective System, during the performance of a clearance order to support scheduled maintenance. The clearance order required opening an electrical disconnect for personnel safety. However, the personnel involved with developing and reviewing the clearance order were unaware that opening this disconnect would result in a reactor trip. As a result of the trip, Reactor Coolant System pressure increased causing the two power-operated relief valves (PORVs) to open as designed. One PORV remained open longer than expected resulting in a valid safety injection actuation signal. The PORV was replaced prior to returning Unit 2 to power. The root causes for this event were in the area of human performance. Corrective actions require clearance orders to be completed and second-reviewed at least three weeks prior to performance of scheduled maintenance and, loss of power/power restoration effects must be clearly understood when electrical isolation devices support clearance orders. Unit 2 was returned to 100 percent power on November 21, 2006. Unit 1 was not affected by this event.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
CALVERT CLIFFS, UNIT 2	05000 318	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	02 ^O F 005
		2006	- 001	- 01	

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

I. DESCRIPTION OF EVENT

On November 16, 2006 at 0018 Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 2 experienced an automatic reactor trip. Unit 2 was operating at 100 percent power prior to the event. There were no structures, systems, or components that were inoperable at the start of the event that contributed to the event. At the time of the trip, a clearance order was being performed in support of scheduled maintenance. As a result of the trip, Reactor Coolant System (RCS) pressure rose to approximately 2420 psia causing the two power-operated relief valves (PORVs) to open. Both PORVs opened as designed. One PORV (2ERV- 402) remained open approximately 90 seconds causing RCS pressure to reduce to 1500 psia. The PORV should have closed slightly below the 2400 psia reset value. As a result of the pressure decrease, a safety injection actuation signal occurred. Although a safety injection actuation signal occurred, this event did not result in a discharge into the RCS because RCS pressure remained above high pressure safety injection pump shut-off head. Once the PORV re-closed, RCS pressure began to rise to the normal values. The PORV (2ERV-402) was replaced prior to returning the Unit 2 reactor to power.

The PORVs are electronic, solenoid-operated valves manufactured by Dresser Industries. The PORV main disc, guide bushing and cage are designed with close tolerances that provide a non interference fit between the individual parts. An inspection of the PORV removed from the system indicated that the tolerances had decreased slightly (cage extruded inward) which prevented the main disc from moving freely within the guide bushing. This is the most likely reason why the PORV did not re-close at the expected pressure.

Also during the event, plant data indicated that one of the two pressurizer safety valves (PSVs) momentarily "simmered," allowing a slight discharge below the level of accumulation necessary to fully open the valve. The impact of the PSV on the event was bounded by the impact from the open PORV. The PSV (2RV200) was replaced prior to returning the Unit 2 reactor to power. The spring loaded PSVs provide RCS overpressure protection. They are manufactured by Dresser Industries. An inspection of the PSV removed from the system indicated that the design thread fit between the valve bonnet and the spring compression screw had been lost, as evidenced by the amount of "play" observed when the compression screw was reinstalled into the bonnet. The as-found lift setting was 2414 psia, which is lower than the 2475 psia as-found lift setting specified in the Technical Specifications. With the design thread fit lost, subjecting the PSV to the thermal effects from the event (including steam from the PORV) may have caused the lift setting to decrease. This is the most likely reason why the PSV "simmered" during the event.

This event met the emergency action level criteria for an Unusual Event due to identified RCS leakage greater than 25 gpm. These criteria were met for the duration that the PORV remained open (approximately 90 seconds). The resultant RCS flow discharged to the Unit 2 quench tank. This flow resulted in a rupture, as designed, of the Unit 2 quench tank rupture disc. The quench tank rupture disc was replaced prior to returning the Unit 2 reactor to power. The Unit 2 reactor was returned to 100 percent power on November 21, 2006. Unit 1 was not affected by this event.

NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION (1-2001) LICENSEE EVENT REPORT (LER)						
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II. CAUSE OF EVENT

The scheduled maintenance that was being performed on November 16, 2006 included an activity to replace service transformer relays to prevent age-related failures. The clearance order for this maintenance activity required opening electrical disconnect 2DISC2D1502 (control power source for P-13000-2 service transformer protection and controls) to provide personnel safety protection during performance of the maintenance. Opening the electrical disconnect provided adequate personnel safety, however, opening the disconnect also affected the main turbine electro hydraulic control (EHC) system. Specifically, opening the disconnect activated the "Load Drop Anticipator" function from the Unit 2 turbine controls. As a result, with the Unit operating at power, the main turbine governor and intercept valves closed resulting in a load rejection and the subsequent automatic reactor trip on high RCS pressure. Personnel involved in establishing the clearance order were unaware of the effect on the EHC system and the fact that a plant trip would occur when the electrical disconnect was opened.

The root cause analysis report (RCAR) developed to address this event (reference condition report number IRE-018-341) determined that the event occurred due to the following root causes:

1. Less than adequate managerial methods contributed to a lack of schedule adherence and inadequate scope control.
2. Less than adequate managerial methods contributed to a lack of clearly defined roles and responsibilities for personnel involved with development and review of complex electrical safety clearances.
3. Less than adequate processes existed to identify and manage the risk associated with "First-Time" maintenance.

The Corrective Actions established to address these root causes, and their contributing causes, are identified in Section IV of this licensee event report (LER).

III. ANALYSIS OF EVENT

The automatic trip of the Unit 2 reactor was initiated due to a valid actuation of the Reactor Protective System. The actuation was not part of a pre-planned sequence during testing or reactor operation. Also, a valid actuation of the safety injection actuation system occurred due to the low pressurizer pressure condition realized when the PORV (2ERV-402) remained open longer than expected. Therefore, this event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A). Immediate notification of this event (Event Number 42995) was made on November 16, 2006 in accordance with 10 CFR 50.72(a)(1)(i), 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A).

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There were no actual nuclear safety consequences incurred from this event. An estimated conditional core damage probability of 8.5E-06 and an estimated conditional large early release probability of 3E-07 were calculated for this event.

IV. CORRECTIVE ACTIONS

- A. Interim compensatory actions were established requiring scheduled clearances to be complete and second-reviewed at least three weeks prior to the scheduled maintenance.
- B. Interim compensatory actions were established to require additional controls whenever an electrical isolation device is used in support of any clearance order.
- C. The PORV (2ERV-402), PSV (2RV200), and Quench Tank #21 Rupture Disc, were replaced prior to returning Unit 2 to power.
- D. Procedures will be revised to incorporate the interim compensatory actions established requiring additional controls and improving the review process for electrical clearance orders.
- E. The design engineering standard that is reviewed when developing electrical clearance orders will be changed to improve operational focus.
- F. The Operations Department will be restructured to ensure the necessary resources are available during preparation and review of electrical clearance orders.
- G. A process will be developed to clearly define roles and responsibilities and improve training of personnel responsible for developing and reviewing electrical clearance orders.
- H. Procedures will be revised to include risk assessment of "First-Time" maintenance.
- I. An online scheduled maintenance scope addition/deletion process will be developed.

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V. ADDITIONAL INFORMATION

A. Component Identification

Component	IEEE 803 EHS Function	IEEE 805 System ID
Main Turbine Governor Valves	V	TA
Main Turbine Intercept Valves	V	TA
Power Operated Relief Valves	20	AB
Disconnect 2DISC2D1502	DISC	EJ
Quench Tank #21 Rupture Disc	RPD	AB
Pressurizer Safety Valves	RV	AB

B. Previous Occurrences

A review of Calvert Cliffs' events over the past several years was performed. No previous occurrences were identified involving a reactor trip due to inadequate tagging clearances.